UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
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OFFICE OF
REGIONAL
COUNSEL

October 25, 2012

Confidential Settlement Communication – Subject to Fed R. Evid. 408

Joseph A. Brogan
Foster Pepper PLLC
1111 Third Avenue, Suite 3400
Seattle, WA 98101-3299

Re: *United States v. Port of Tacoma, et al.*, No. 11-cv-05253 (W.D. Wa.)
Basis of Design for Compensatory and Additional Mitigation
Upper Clear Creek Restoration - Preliminary Hydrologic and Hydraulic Modeling

Dear Mr. Brogan,

The attached technical memorandum provides comments on the October 4, 2012 draft of the "Upper Clear Creek Habitat Site - Preliminary Hydrologic and Hydraulic Analysis" prepared for the Port of Tacoma by Herrera Environmental Consultants. The memorandum provides specific recommendations regarding various elements of the design and modeling efforts to date. Please feel free to contact me at 206-553-6052 with any questions or if the Port of Tacoma would like to discuss our recommendations in more detail.

Sincerely,

/s/

Kimberly A. Owens
Assistant Regional Counsel

Attachment

CC: Michael Szerlog, EPA
Mary Anne Thiesing, EPA
Austin Saylor, DOJ
Kent Hanson, DOJ

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Technical Memorandum
October 24, 2011

To: Kim Owens - EPA Region X
Kent Hanson - US DOJ/ENRD
Austin Saylor - US DOJ/ENRD

From: Lyndon C. Lee, Ph.D., PWS
L.C. Lee & Associates, Inc. &

Through: Mary Anne Thiesing, Ph.D., PWS
US EPA - Region X

Ref: Comments on Upper Clear Creek Restoration preliminary hydrologic and hydraulic modeling and design

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This Technical Memorandum has been prepared to offer comments on the October 4, 2012 draft of the "Upper Clear Creek Habitat Site - Preliminary Hydrologic and Hydraulic Analysis" prepared for the Port of Tacoma by Herrera Environmental Consultants. Overall, this preliminary effort is a reasonable start in supporting the Clear Creek restoration design effort. We look forward to more detailed analyses as the design matures. Comments regarding elements of the design and modeling efforts to date are itemized below.

1. Models and Large Flooding Events: As the authors point out, management of water levels within the Clear Creek channel and floodplain system at its distal end/junction with the Puyallup River places certain constraints on the hydrologic modeling effort. The authors' focus on relatively small events in this preliminary effort is understandable. However, a focus on small, frequent events does not necessarily address the continued management regime of water levels and backwater in the Clear Creek system. Specifically, how will such management impact the structure and functioning of the restoration during larger than the annual and two-year return events? What do the 5, 10, 25, 50 and 100-year events look like now and with the proposed design? Do these larger events (now and in the future) result in so much water ponding or slowly flowing through the Clear Creek site as to preclude sustainable development and functioning of the mosaic of scrub/shrub, forested, and emergent waters/wetlands that are part of the overall project goals?

Overall, the current design recommendation calls for a narrower, shallower channel; however, the design needs to make allowances for larger flood events, and this design feature should be evaluated when considering all of the potential flood and watershed build-out scenarios. Retention time during larger flood events may be such that deeper water on site will not affect the proposed habitats to a material degree; however, we recommend that the higher flood events

be considered before finalizing these features, since they drive the functioning of the proposed system.

2. Overflow and Backwater Area - North Reach of Existing Channel: It is interesting and encouraging that the preliminary design abandons the southern portion of the existing channel, which is straightened, laterally constrained, and degraded. However, leaving the northern (downstream) reach of the existing channel intact as an "overflow and backwater" does not seem appropriate. In particular, we find no natural analogs in the regional reference framework. Further, this reach of the channel system will continue to be degraded and because it is designed as a dead end, it could serve to trap fish. Other than cost savings for backfill of this northern reach, the reason for keeping it is not clear. We recommend that the rationale for this component of the channel system be explicitly stated in terms of how it supports the system, keeping in mind that degraded features that are likely to trap endangered fish species may not be approved.

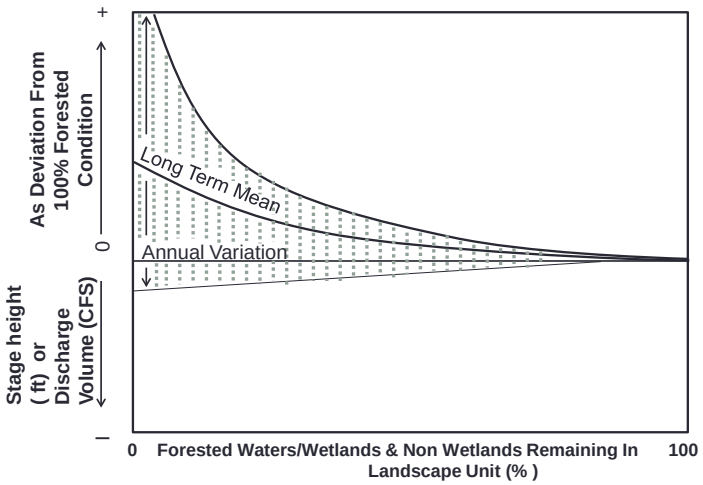
3. Large Wood/Deflection & Apex Structures: The preliminary diagrams of the two large wood deflection structures in the upstream portions of the restoration reach do not provide sufficient detail to determine how they function. Outstanding questions include: Is there bypass of water past the first (upstream) structure? If so, how much and how was this choice made? How does the second structure function? Are these the only large wood structures in the design? What about deflection and bar apex jams in the newly constructed channel reaches? These questions should be addressed as the design effort progresses.

4. Southeastern Pond/Channel System: The preliminary design for the southeastern portion of the site shows an overflow and backwater channel that dead ends in a pond. This feature is odd with respect to its location on valley alluvium, mainly because the scale of the outlet channel is not in sync with what would be the energy signature of the outflow from the pond. The channel appears too big in the preliminary design. Please reconsider the scale here. If this is likely to be addressed by the recommended changes in channel size/depth, please identify this in the design as it progresses.

5. Engaging the Floodplain: The preliminary design recommends making most of the channel systems that are shown smaller, so that the floodplain is engaged more often. This appears to be a correct direction, because we generally like to see floodplains associated with systems like Clear Creek engaged at about the one year return. At some point in this early design process, it will be necessary to understand how often certain regions/sections of the floodplain are engaged with floodwaters, how deep, and for how long. This type of information is vital to planning bulk and finish earthwork, planting plans, construction sequencing, etc.

6. Cumulative Effects Of Development In Clear Creek Watershed: Other than the overflow and backwater features shown in the preliminary design, there are no apparent provisions for increased stage/discharge from the Clear Creek watershed with increasing impervious surfaces over time. Figure 1 depicts a generalized scenario for increasing stage heights and discharge volumes with decreasing forest cover and increasing hardscape in the Puget Sound Lowlands. Certainly population/development growth projections for the Clear Creek watershed suggest that consideration of decreases in times of concentration, and increases in Clear Creek stage elevations and discharge volumes, are in order. The design plan should include consideration of what this system will look like in 25 years when the watershed is > 50-60 % built out.

Figure 1



(Modified from: Lee, L. C. and J. G. Gosselink. 1988. Cumulative impact assessment in bottomland hardwood forests: linking scientific assessments with regulatory alternatives. Environmental Management 12(5):591 -602.)

7. Microtopography: The preliminary design proposes hummocks and mounds as microtopographic features. This is good, because, as the authors point out, it gives the restoration site complexity and allows for a more diverse array of planting surfaces. The scale of the microtopographic features shown in the preliminary design, however, appears large and, again, not necessarily in sync with the microtopographic roughness elements that are typical to stream ecosystems that are the same size as Clear Creek throughout the Puget Sound Lowlands. Please consider breaking up the microtopographic features into smaller pieces that consist of pits and mounds that can exist with and without large wood. These features can connect hydrologically at some point of flooding and thus provide the floodplain system the function of landscape-scale hydrologic connection, increased short and long term storage of flood waters, off channel refugia for adult and juvenile fish, etc. Another element of microtopography consists of individual pieces or piles of large down "habitat" wood spread randomly or partially buried throughout the floodplain. We recommend that consideration should be given to incorporating "habitat" wood in the design.

8. Reed Canary Grass/Weeds: In several places, the preliminary design talks about scraping approximately one foot of soil from areas dominated by reed canary grass. From the narrative, it appears that this grading is an effort to control reed canary grass, spread water out on the floodplain, and gather soil for construction of mounds/microtopography. However, based on our experience with reed canary grass on Holocene alluvium throughout the Puget Sound Lowlands, the bulk of the fine and medium root biomass exists within the top 18" or so of the soil. These roots store a great deal of energy, which allows reed canary grass to re-sprout vigorously. Please assess the distribution of root biomass on the Clear Creek floodplain surfaces dominated by reed canary grass and adjust the grading so that it achieves desired elevations combined with effective weed control. In addition, it is our collective experience that if the aerial stems and roots of reed canary grass are being composted in mounds, at least 2 feet of clean mineral soils should be used as a cap. This thickness is the minimum necessary to dampen the diurnal heat flux and thus preclude warming of soils and creation of favorable re-sprouting environments.